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(56) Documents cited
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(54) **Cash collection devices**

(57) A cash collection device for charitable donations comprises a coin recognition unit (6) into which the donations are inserted to fall into a collecting receptacle (4) locked within an outer casing (2). Data processing means (10) connected to the coin recognition unit validates each coin and increments a memory from which a visual display (12) is operated to show the total amount donated. After each donation a speech generator is activated to give vocal acknowledgement. An audible alarm is operated if an attempt is made to remove the cash collected without using a security key or if there is failure of mains supply, an internal battery (18) then providing power for the device.

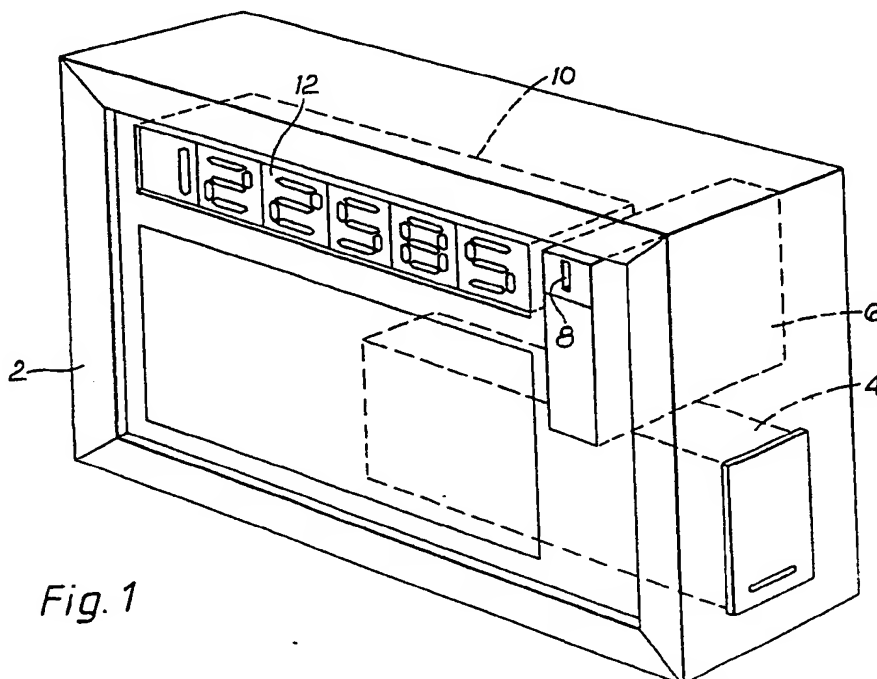
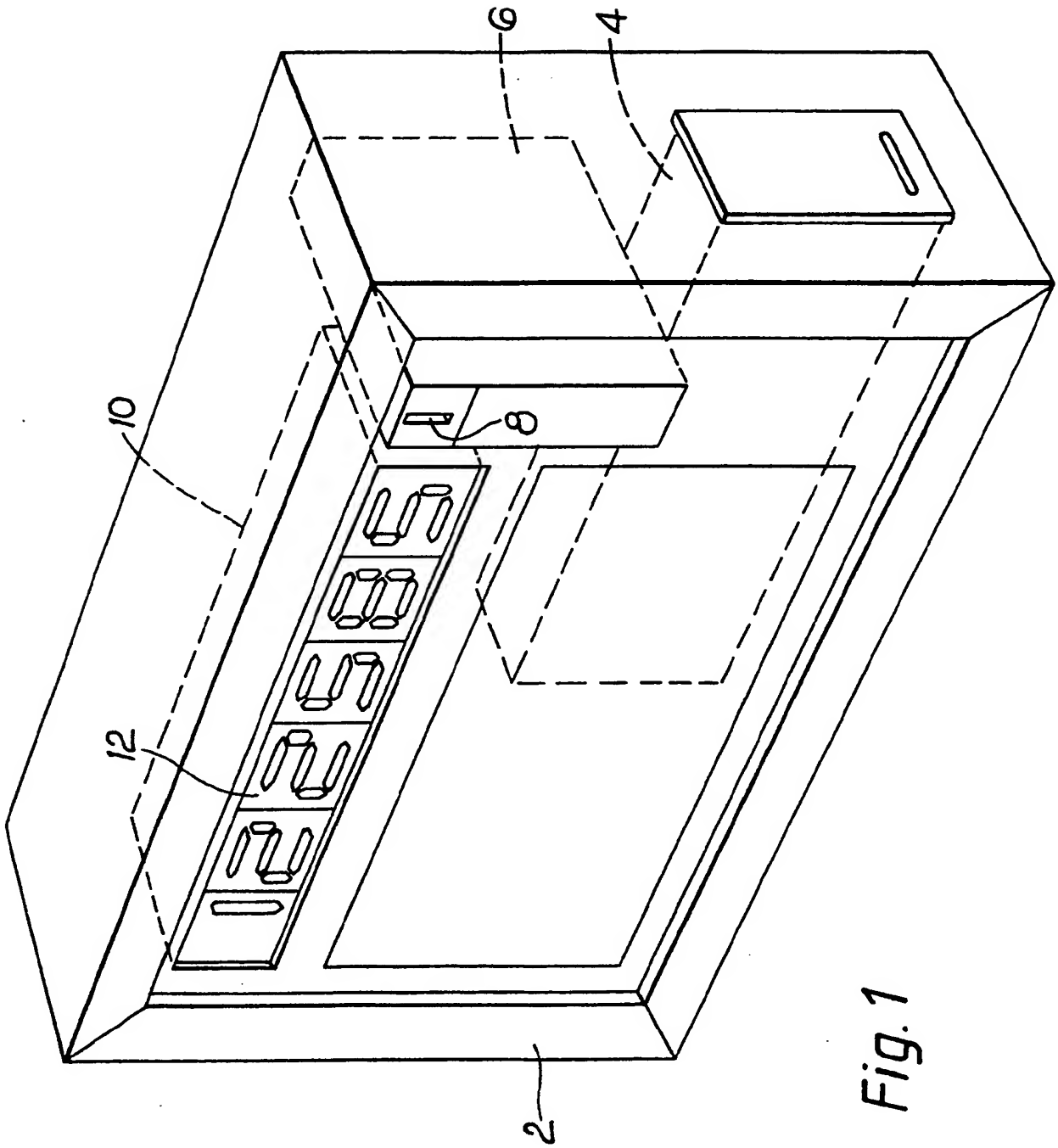


Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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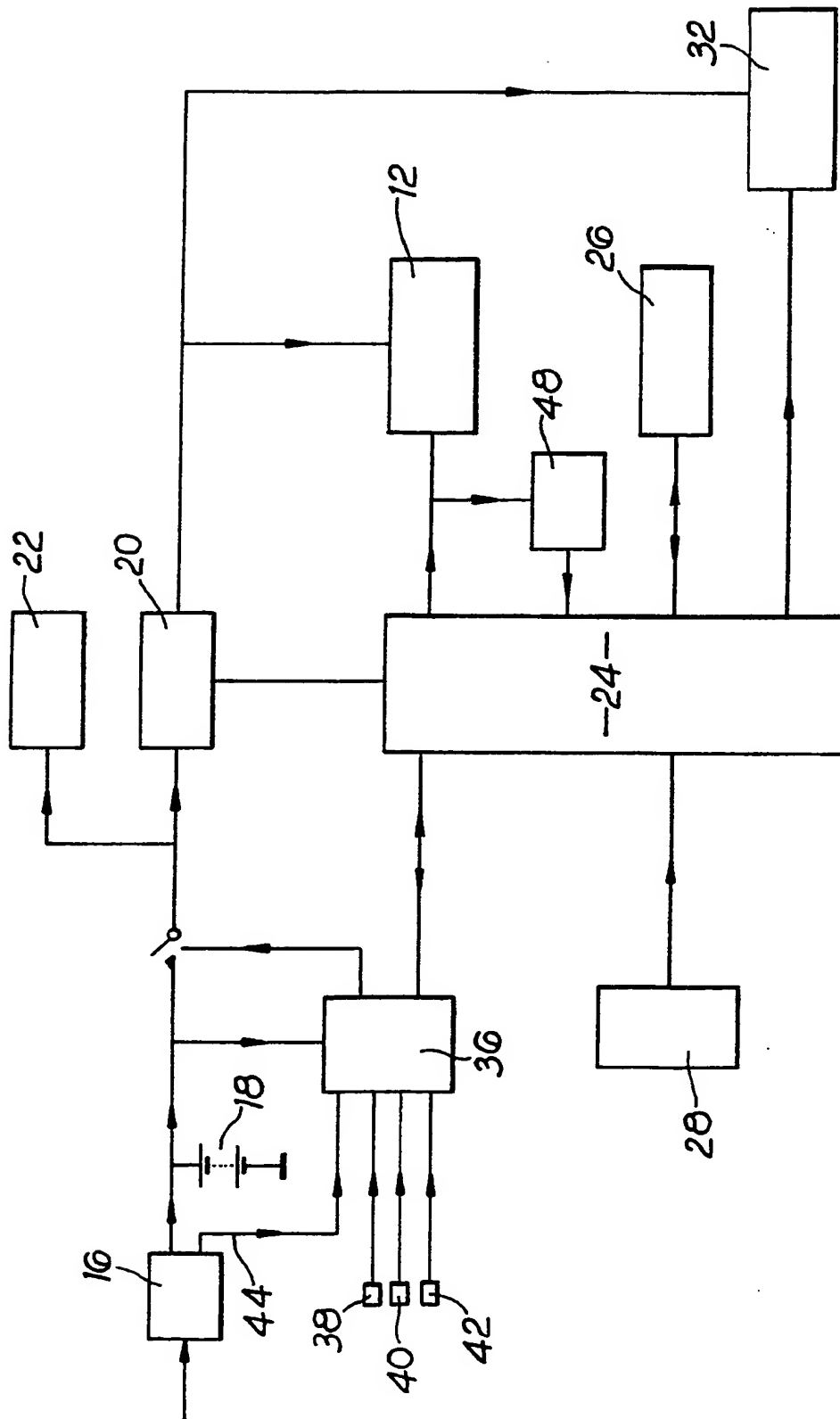


Fig. 2

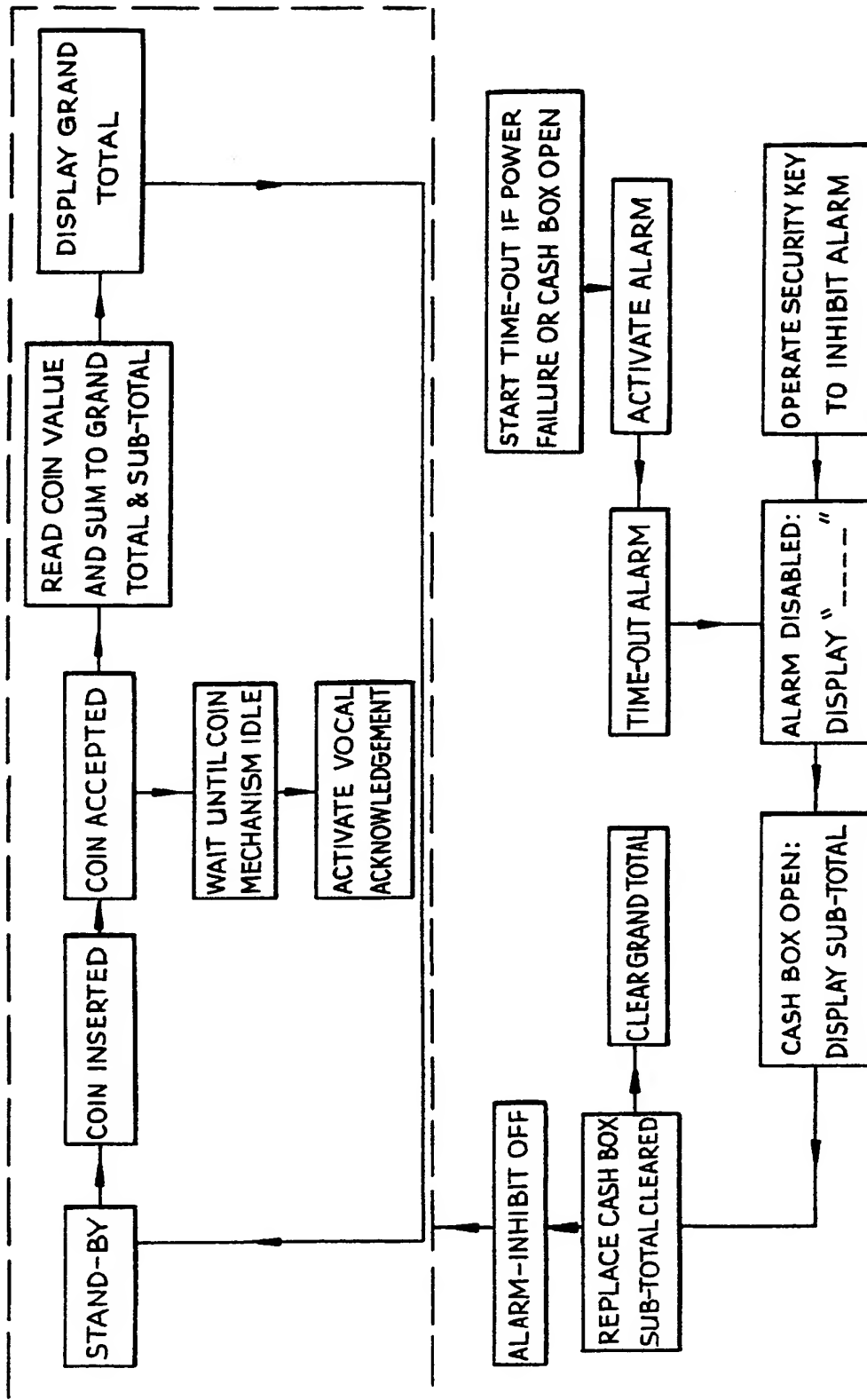


Fig. 3

CASH COLLECTION DEVICES

This invention relates to cash collection devices, eg., for collecting charitable donations.

According to the invention there is provided a cash collection device comprising a receptacle for the cash
5 inserted, means for identifying the value of coins and/or banknotes inserted into the device, electronic data processing means having an input from said identifying means and including memory means for holding data of the total value of the money inserted, the device further comprising a
10 visual display means arranged to display said total, and means for generating an audio signal when cash is inserted.

By constructing such a device in a suitably secure form it can be employed to collect charitable donations and provide a running total of the donations.
15 The display of the total value of money contributed is intended to be continuously visible to encourage donors to add to this, and this display total can be immediately incremented when a donation is inserted. At the same time the audio signal, intended as further encouragement for
20 donors, is generated. In this respect, the audio signal is preferably a spoken acknowledgement, preferably generated by speech synthesis circuitry.

To guard against any unauthorized attempt to gain

access to the cash collected, an audible and/or visual alarm can be provided. Conveniently, the cash total display means can be employed when a visual alarm is used and, when an audible alarm is used, the same audio signal means as for
5 the spoken acknowledgement.

The alarm means may comprise a circuit which remains continuously activated through an internal battery supply and which can only be deactivated by a security key inserted by an authorised user to switch on an alarm inhibit
10 function in the data processing means. It may be arranged that the same key is also required to give access to the cashbox for emptying it, but preferably a further lock prevents removal of the cashbox from the deactivated device and a separate key is needed to release and open the cash
15 box.

An example of the invention will be described in more detail with reference to the accompanying drawings, in which,

Fig. 1 is an oblique view of a cash collection
20 device according to the invention,

Fig. 2 is a block diagram of the electronic system within the device, and

Fig. 3 is a flow diagram illustrating some of the functions of the electronic system.

25 As indicated in Fig. 1, the apparatus comprises an outer casing 2 which may be free-standing or wall-mounted and which has an electrical cable connection (not shown) to a mains supply. Within the outer casing 2 is a cash

collection box 4 fixed in place by a security lock (not shown). A coin recognition unit 6, which may be of known form, is mounted above and opens directly into the cash collection box 4 so that coins inserted through slot 8 of the unit in the front face of the apparatus fall into the box after being identified. The recognition unit 6 is connected to an electronic data processing unit 10 to input to it the coin values. The data processing unit, to be described in more detail below, operates a numerical display 12, visible on the front face of the casing 2, of the total amount of cash inserted through the identification unit.

In Fig. 2 the main components of the data processing unit 10 are indicated in block form. The construction of these units is either known or can be readily devised by those skilled in the art and they are therefore not illustrated in detail.

The mains power supply is connected through a battery charger 16 of the unit, the battery 18 providing stand-by power for the apparatus, in particular for an alarm, in the event that mains power is switched off or disconnected. Voltage regulation units 20, 22 provide, respectively an 18 volt power supply and a 5 volt logic supply for the unit. A micro-processor 24 coordinates all control and supervisory actions of the unit, including operating the visual display 12, tracking the system status and maintaining memories. The latter includes an external non-volatile electrically erasable PROM 26 that holds the

cashbox total value. Connected to the processor 24 is the coin identification means 28 of the recognition unit 6 which, having validated a coin inserted through the slot 8 issues an identification code to the processor for updating the memory 26 and the display 12. A further function actuated by the processor 24 on insertion of a coin is activation of an audible output means 32 which comprises a speech generator. For this purpose the means 32 includes a replaceable PROM for storing sound data in digital form, and a counter driven from a free-running clock source to sequence through the address range of the memory, the output being converted to analog form to feed an audio power amplifier and loudspeaker. It is also possible to drive the amplifier directly from the processor 24 to generate an audible alarm.

The display 12 is an LED array in a common anode configuration. Each anode is connected individually to a power supply through an eight-bit shift register while the cathode of each element of the digits is common with the equivalent elements of the other digits to give an array of eight common cathodes. Both the cathodes and the anodes are buffered by high current drivers. At each clock pulse, therefore, the processor will present new cathode data, but only the appropriate individual digit will be operated because this data is presented in sequence with the clocking of the shift register that selects the intended digit by stepping through the anodes at each pulse. The display includes a decimal point for indicating decimal currency and

the logic is preferably so arranged that, leading zeros are suppressed up to but not including the units digit. A comma can be arranged to appear when the displayed number exceeds 1000.

5 A control unit 36 serves to inhibit the alarm when the cashbox 4 is to be emptied. In this respect a switch 38 must firstly be operated by a security key to signal to the control unit that the cashbox is to be accessed with authorisation so that the alarm function is
10 inhibited. The security lock can then be released by a separate key to gain access to the cashbox without the alarm going off. A switch 40 within the casing 2 provides a signal indicating that the cashbox has been removed for emptying. When this signal is present the control unit 36
15 will actuate the processor 24 to generate an alarm signal if the switch 38 is operated to place the alarm circuit in a ready state again without the cashbox 4 having been returned to its place. The control unit 36 also receives a signal from a manual restart switch 42 accessible within the
20 apparatus when the cashbox 4 has been removed, by means of which the visual display can be zeroed.

 The control unit 36 also receives an input 44 from the battery charger 16 to indicate if the external power supply has been interrupted. If so, the control unit 36
25 will also actuate the processor 24 to generate an alarm signal. To minimise the nuisance value of an audible alarm, and also to conserve power when the device is deprived of

mains supply and operating from battery 18, the alarm is preferably switched off by the processor 24 after a given delay period, eg. 5 minutes, from activation.

Advantageously, the processor 24 is so programmed
5 that, in the absence of mains power it will shut down to a power-conserving quiescent state after a short period of inactivity, although it will remain in a state of readiness for actuation by the insertion of a coin into the recognition unit 6 or by any of the aforesaid series of
10 inputs from the control unit 36. Such inputs in the present example arise from the operation of the alarm-inhibit switch 38, the cashbox-open switch 40, the manual restart switch 42 or the battery charger input 44.

15 Fig. 2 also shows a monitor circuit 48 that will output to the processor 24 if it detects that the display signals from the processor have failed during an activation period of the processor and will then cause the processor 24 to be reset.

20 The totals to be displayed are held in the electrically erasable PROM 26, which can be arranged to store both the current total sum in the cashbox 4 and an accumulated total including sums previously emptied from the cashbox 4. It may carry other data of the state of the unit
25 for management or maintenance purposes. It is read and written under the control of the processor 24. During normal operation, the memory is incremented in accordance

with the signals from the coin recognition unit 6 as coins are inserted and the display 12 is correspondingly changed. It will usually be arranged that the accumulated total is displayed.

5 The visual display 12 is incremented as each coin is validated. In addition when a donor inserts one or more coins, after the final coin has passed through the recognition unit 6, a delay period, eg., $2\frac{1}{2}$ seconds, is timed out and the speech generator of the audible output means 32 is then activated to play an acknowledgement message to the donor.

 The alarm inhibit switch 38 is of course set in an off position (i.e. the alarm circuit is armed) when the apparatus is operative. To empty the cashbox 4, the security key is inserted to place the switch 38 in the on position. The alarm function is thereby suppressed, and the display 12 which has shown the accumulated total collected up to now, is switched to show a line of dashes. Using a further key, the cashbox 4 can then be freed and removed.

15 The signal from the switch 40 is now input to the processor to cause the display 12 to switch over to show the sub-total in the cashbox 4 so that this can be recorded by the collector and checked. The dashes appear again on the display 12 when the switch 40 detects the cashbox 4 has been replaced and the sub-total value is cleared from the memory.

20 After relocking the cashbox 4, by turning the alarm inhibit key then to the off position again, the display 12 returns to the blank quiescent state and the apparatus is ready for use again, with the display showing the new accumulated

25

total as coins are inserted and the new sub-total being recorded in the memory to be recalled when the cashbox is again emptied. If required, the accumulated total can be zeroed before the cashbox 4 is replaced by operating the manual restart key 42.

As previously mentioned, the processor 24 can operate independently of connection to a mains supply by using the battery 18 within the device. Removal of the cashbox without first disarming the alarm circuit via the alarm inhibit switch 38 will therefore cause the audible output means 32 to sound an alarm immediately and may also be arranged to flash a "HELP" message on the display screen 12. The alarm will continue to sound for a predetermined period (such as 5 minutes) or until deactivated by the key-operated alarm inhibit switch 38 being switched to its own position. If the cashbox 4 is replaced before the switch 38 is put into its on position, the alarm may continue to sound but the display 12 will indicate the change of state, eg. by showing the grand total value flashing. The alarm, as already indicated, can be arranged to sound if the mains supply to the device fails or is cut off. The alarm circuit can also be employed to indicate malfunction within the electronic unit, eg. to indicate faulty formatting of the PROM, and for such purposes a different audio signal can be generated to denote the function.

Claims

1. A cash collection device comprising a receptacle for cash inserted into the device, means for identifying the value of coins and/or banknotes inserted, data processing
5 means having an input from said identifying means and including memory means for holding data of the total value of the money inserted, the device further comprising a visual display means arranged to display said total, and means for generating an audio signal when cash is inserted.
- 10 2. A device according to claim 1 wherein said audio signal generating means comprises a speech generator.
3. A device according to claim 1 or claim 2 wherein means for actuation of the audio signal comprises delay means so that the audio signal is sounded at an interval
15 after the insertion of cash has ceased.
4. A device according to any one of claims 1 to 3 wherein said audio signal means is also arranged to be actuated to provide an alarm signal.
5. A device according to claim 4 wherein the alarm
20 circuit is arranged so as to be switched between activated and inhibited states by a security key means.
6. A device according to claim 5 wherein the receptacle for inserted cash is arranged to be locked within

the device and a further key means is provided to enable it to be removed without sounding an alarm, after the security key means has deactivated the alarm circuit.

7. A device according to claim 6 wherein said
5 operation of the security key means is indicated on the visual display means.

8. Apparatus according to claim 6 or claim 7 wherein,
after removal of the receptacle, alarm means are arranged to
sound if the device is reactivated by said security key
10 means before reinsertion of the receptacle.

9. A device according to any one of claims 6 to 8
wherein removal of the receptacle after said operation of
the security key means is arranged to trigger a display on
the visual display means of the total cash in the
15 receptacle.

10. A device according to any one of the preceding
claims wherein the memory means are arranged to retain a
record of the total cash inserted whereby to permit a
cumulative total of cash collected to be displayed after the
20 cash has been removed from the device.

11. A device according to claim 10 wherein said
cumulative total can be cancelled from the memory by
operation of a manual control that is arranged to be

accessible when the cash is being removed.

12. A device according to any one of the preceding claims comprising an internal stand-by battery for powering said data processing means and visual display means.

5 13. A cash collection device constructed and arranged for use and operations substantially as described herein with reference to the accompanying drawings.

Amendments to the claims have been filed as follows

1. A cash collection device comprising a casing enclosing a receptacle for cash inserted into the device and means for identifying the value of coins and/or banknotes inserted, data processing means having an input from said identifying means and including memory means for holding data of the total value of all cash inserted, visual display means mounted on the casing, and means for generating an audio signal, characterised in that the visual display means is arranged to continuously display to the exterior the total value of all cash inserted, the data processing means being operative upon each cash insertion, to increment both the total value held in the memory and the total value displayed by the display means and to actuate the audio signal generating means to provide a spoken acknowledge of receipt.

2. A device according to claim 1 wherein means for actuation of the audio signal comprises delay means so that the audio signal is sounded at an interval after the insertion of cash has ceased.

3. A device according to claim 1 or 2 wherein said audio signal means is also arranged to be actuated to provide an alarm signal.

4. A device according to claim 3 wherein the alarm circuit is arranged so as to be switched between activated and inhibited states by a security key means.
5. A device according to claim 4 wherein the receptacle for inserted cash is arranged to be locked within the device and a further key means is provided to enable it to be removed without sounding an alarm, after the security key means has deactivated the alarm circuit.
6. A device according to claim 5 wherein said operation of the security key means is indicated on the visual display means.
7. Apparatus according to claim 5 or 6 wherein after removal of the receptacle, alarm means are arranged to sound if the device is reactivated by said security key means before reinsertion of the receptacle.
8. A device according to any one of claims 5 to 7 wherein removal of the receptacle after said operation of the security key means is arranged to trigger a display on the visual display means of the total cash in the receptacle.
9. A device according to any one of the preceding claims wherein the memory means are arranged to retain a

record of the total cash inserted whereby to permit a cumulative total of cash collected to be displayed after the cash has been removed from the device.

10. A device according to claim 9 wherein said cumulative total can be cancelled from the memory by operation of a manual control that is arranged to be accessible when the cash is being removed.

11. A device according to any one of the preceding claims comprising an internal stand-by battery for powering said data processing means and visual display means.

12. A cash collection device constructed and arranged for use and operations substantially as described herein with reference to the accompanying drawings.